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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Borealis Technical Limited  
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EXAMINER

TAMAI, KARL I

ART UNIT	PAPER NUMBER
2834	

MAIL DATE	DELIVERY MODE
05/15/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/823,483

Applicant(s)

TAVKHELIDZE ET AL.

Examiner

Tamai I.E. Karl

Art Unit

2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 26 April 2007.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4)  Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5)  Claim(s) \_\_\_\_\_ is/are allowed.
- 6)  Claim(s) 1-14 is/are rejected.
- 7)  Claim(s) \_\_\_\_\_ is/are objected to.
- 8)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9)  The specification is objected to by the Examiner.
- 10)  The drawing(s) filed on \_\_\_\_\_ is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11)  The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a)  All    b)  Some \*    c)  None of:
1.  Certified copies of the priority documents have been received.
  2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1)  Notice of References Cited (PTO-892)
- 2)  Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3)  Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5)  Notice of Informal Patent Application
- 6)  Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shakouri et al. (Shakouri)(US 5955772) and Fitzpatrick ("Close-Spaced Thermionic Converters with Active Spacing Control and Heat Pipe Isothermal Emitters"). Shakouri teaches a vacuum thermionic heat pump with a cathode and anode 12, 16 spaced from each other across a vacuum 14, and an external circuit with a power source. Shakouri teaches every aspect of the invention but does not teach a positioning means for positioning the electrodes or capacitor sensors. Fitzpatrick teaches a capacitor

Art Unit: 2834

sensors and piezoelectric actuators (see page 924) to position the electrodes in a thermal energy transfer device. Fitzpatrick teaches three sensors and three actuators to maintain the parallel surfaces, which suggests independent control of the actuator by the microprocessor. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the heat pump of Shakouri with the actuators of Fitzpatrick to provide adjustable electrodes of increased efficiency and power density.

4. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shakouri et al. (Shakouri)(US 5955772) and Fitzpatrick ("Close-Spaced Thermionic Converters with Active Spacing Control and Heat Pipe Isothermal Emitters"), in further view of Richards (US 4281280). Shakouri and Fitzpatrick teach every aspect of the invention except the inert gas argon between the electrodes. Richards teaches the region between the electrodes can be either evacuated or filled with an inert gas such as argon to transport energy from the emitter to the collector. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the machine of Shakouri and Fitzpatrick with the region between the electrodes being evacuated or filled with argon because Richards teaches that the vacuum or argon allows the transportation of electrons from the cathode to the anode, and because it has been held that selection of known equivalents is within the ordinary skill in the art.

5. Claims 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shakouri et al. (Shakouri)(US 5955772) and Fitzpatrick ("Close-Spaced Thermionic

Art Unit: 2834

Converters with Active Spacing Control and Heat Pipe Isothermal Emitters”), in further view of Huffman (“Preliminary Investigations of a Thermotunnel Converter”). Shakouri and Fitzpatrick teach every aspect of the invention except the electrons tunneling between the emitter and collector, and the spacing being within 200 angstroms (claims 11-14). Huffman teaches the closing spaced electrodes cause a qualitative increase in the operation of thermionic devices, such as 10 angstroms. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the heat pump of Shakouri and Fitzpatrick with the spacing of 10 angstroms causing tunneling to improve the qualitative operation of the device as taught by Huffman.

### ***Response to Arguments***

Applicant's arguments filed 4/26/2007 have been fully considered but they are not persuasive. Applicant's argument that there is no motivation to combine the references is not persuasive. Fitzpatrick provides clear and literal motivation to utilize capacitive sensors and piezoelectric devices in thermionic devices to provide precise gap maintenance over long durations and varying thermal conditions (page 924). The In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The examiner notes the Applicant's arguments against the Shakouri individually is not persuasive when the rejection is made over Shakouri and Fitzpatrick, (see *In re Keller*,

Art Unit: 2834

642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986) Holding one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)). Applicant's arguments regarding the spacing of the electrodes is not persuasive because it is not a limitation in claim 1, and is properly rejected over Huffman in claim 11.

Applicant's argument that Shakouri teaches away from the operating range of Fitzpatrick is not persuasive because the limitation is not claimed. Furthermore, a reference may be said to teach away when a person of ordinary skill, upon (examining) the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." *Para-Ordnance Mfg. v. SGS Importers Int'l*, 73 F.3d 1085, 1090, 37 USPQ 2d 1237, 1241 (Fed. Cir. 1995) (quoting *In re Gurley*, 27 F.3d 551, 553, 31 USPQ 2d 1130, 1131 (Fed. Cir. 1994)). Shakouri teaches the "typical range" is .01 to 1 micron (col. 7, line 49), but does not teach that the range of Fitzpatrick should be avoided.

Applicant's argument that Shakouri is complete is not persuasive. The combined teaching of Shakouri with the piezoactuators of Fitzpatrick provides for thermal distortion and expansion that may occur over extended periods of service. Applicant's argument regarding bodily incorporation is not persuasive because the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed

Art Unit: 2834

invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

The combined teaching is a thermionic device that can compensate for thermal variations and operated for extended periods of time. The rejection is proper and maintained.

### ***Conclusion***

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karl I.E. Tamai whose telephone number is (571) 272 - 2036.

Art Unit: 2834

The examiner can be normally contacted on Monday through Friday from 8:00 am to 4:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Darren Schuberg, can be reached at (571) 272 - 2044. The facsimile number for the Group is (571) 273 - 8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Karl I Tamai  
PRIMARY PATENT EXAMINER  
May 14, 2007



KARL TAMAI  
PRIMARY EXAMINER